

# **Joint Longitudinal Viewer (JLV) 3.0.0.0.2**

## **Veterans Affairs Enterprise Cloud**

### **Deployment, Installation, Backout, and Rollback Guide (DIBRG)**



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**Department of Veterans Affairs**

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## Revision History

Date	Version	Description	Author
04/06/2022	1.0	Addressed feedback and submitting the document for approval	Liberty ITS
04/04/2022	0.2	Comments addressed and updates included	Liberty ITS
03/14/2022	0.1	Initial creation of document from last approved	Liberty ITS

## Artifact Rationale

This document describes the Deployment, Installation, Backout, and Rollback Guide (DIBRG) for Joint Longitudinal Viewer (JLV) releases going into the Department of Veterans Affairs (VA) Enterprise Cloud (VAEC). The Guide includes information about system support, issue tracking, and escalation processes, and it identifies the roles and responsibilities involved in all those activities. Its purpose is to provide clients, stakeholders, and support personnel with a smooth transition to the new product or software, and this artifact should be structured appropriately to reflect the particulars of these procedures at a single or at multiple locations.

Per the Veteran-focused Integrated Process (VIP) Guide, the Deployment, Installation, Backout, and Rollback Guide is required to be completed prior to Critical Decision Point 2 (CD2), with the expectation that it is updated throughout the life cycle of the project for each build as needed.

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# 1. Introduction

Born from a joint Department of Defense (DoD)–Department of Veterans Affairs (VA) venture called JANUS, Joint Longitudinal Viewer (JLV) was directed by the Secretary of the VA and the Secretary of Defense in early 2013 to further support interoperability between the two departments. JLV is a centrally hosted, Java-based web application managed as two similar but distinct products - one tailored for DoD use and another tailored for VA use. Each JLV product is deployed to its respective DoD and VA hosting environments. Although separately hosted, the respective applications use several shared data services. The browser-based, Graphical User Interface (GUI) provides an integrated, read-only view of Electronic Health Record (EHR) data from VA, DoD, and community partners within a single application.

JLV eliminates the need for VA and DoD clinicians to access disparate viewers. The GUI retrieves clinical data from several native data sources and systems, then presents it to the user via widgets, each corresponding to a clinical data domain.

Users can create and personalize tabs, drag, and drop widgets onto tabs, sort data within a widget's columns, set date filters, and expand a widget for a detailed view of patient information. Within each widget, a blue circle indicates VA data; an orange square indicates DoD data; a purple hexagon indicates community partner data; and a green triangle indicates Cerner Millennium Federal Electronic Health Record (FEHR) data.

## 1.1. Purpose

The Deployment, Installation, Backout, and Rollback Guide (DIBRG) provides a single, common document that defines the ordered, technical steps required to install and deploy the JLV product. Further, it outlines the steps to back out of the installation and roll back to the previously installed version of the product if necessary. The installation process is completed in the VA Enterprise Cloud (VAEC).

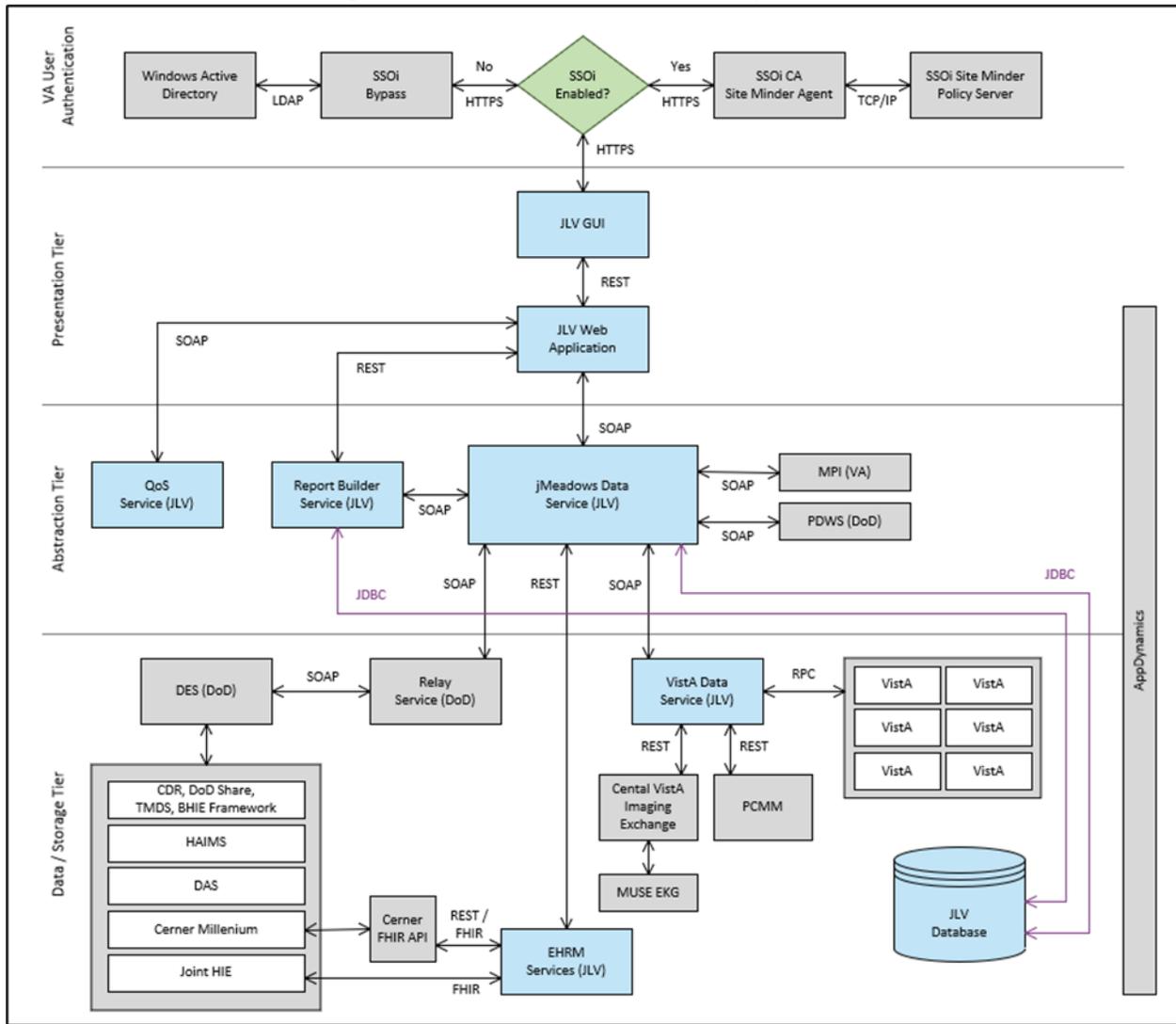
System design specifications and diagrams can be found in the REDACTED<sup>1</sup>.

[Figure 1](#) illustrates the three tiers (presentation, abstraction, and data/storage) of the JLV architecture, the location of JLV system components within the tiers, the external systems that JLV communicates with in Enterprise environments, and the communication protocols and authentication methods used. In the diagram, components of JLV are shaded blue; external systems are shaded grey.

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<sup>1</sup> **NOTE:** Access to the VA JLV Product Repository on GitHub is restricted and must be requested.

Figure 1: JLV Architecture and Components<sup>2</sup>



<sup>2</sup> Active Directory (AD), Application Program Interface (API), Bidirectional Health Information Exchange (BHIE), Central VistA Imaging Exchange (CVIX), Clinical Data Repository (CDR), Computer Associates (CA), Data Access Service (DAS), Data Exchange Service (DES), Electronic Health Record Modernization (EHRM), Fast Healthcare Interoperability Resources (FHIR), Healthcare Artifact and Image Management Solution (HAIMS), Health Information Exchange (HIE) HyperText Transfer Protocol Secure (HTTPS), Internet Protocol (IP), Java Database (DB) Connectivity (JDBC), Lightweight Directory Access Protocol (LDAP), Master Person Index (MPI), Military Health System (MHS), Patient Discovery Web Service (PDWS), Quality of Service (QoS), Remote Procedure Calls (RPCs), Representational State Transfer (REST), Single Sign On Internal (SSOi), Simple Object Access Protocol (SOAP), Theater Medical Data Store (TMDS), Transmission Control Protocol (TCP), Veterans Health Information Systems and Technology Architecture (VistA) Data Service (VDS)

## 1.2. Dependencies

JLV is dependent on ancillary systems that connect the application to specific data sources. If any of these sources encounter a disruption in data services, the data is not pulled into JLV.

JLV is also dependent on internal VA update requirements, including DB updates, machine image updates, and security patches. If any of the VA Enterprise operational procedures disrupt the normal operation of JLV, the application is not fully functional.

The physical environment is Amazon Web Services (AWS) - GovCloud western region. The VAEC provides security and environmental control over the JLV servers and are restricted by Elevated Privilege (EP) access. Project personnel request EP access by submitting the *JLV Linux (Centrify) and Windows Access Requirements* spreadsheet to the VA project manager (PM) / Contracting Officer Representative (COR) for approval via the Elevated Permissions Access System. AWS Console access is requested through the VAEC ticketing system. Any delay in granting initial EP access hinders the ability to respond to technical impacts to the servers.

Developers create the code which describe each individual service, the code is saved as a template. Joint Longitudinal Viewer (JLV) in the VAEC uses Docker, which is an industry standard, open-source platform making it possible to create and run containers. Containers isolate application components and their dependencies. Containers also provide virtualization and scalability. Containers bundle together an application's code with all the runtime libraries, system tools and setting needed to support the application. A container is a logical environment created on a computer where an application can run.

Containers and virtual machines are both “packages.” A container is a package that includes your application and everything it needs to run, aside from the operating system. A virtual machine is a package that includes your application and everything it needs to run, including the operating system.

The first step in the process is to create a template that describes all the resource properties and the configuration of these needed resources. This template is then built and stored in a repository which can be pulled and ran in all environments from development to production.

Container technology has allowed applications to be decomposed into different smaller services. This technological approach is named Microservices. Microservices are small independent services that communicate over well define Application Programming Interfaces (APIs). Services are built as independent components for business capabilities that run each application process as a service and performs a single function. Each component service in a microservices architecture can be developed and scaled without affecting the functioning of other services. Services do not need to share any of their code or implementation with other services. Any communication between individual components between individual components happens via well-defined APIs.

JLV in VAEC is built on a microservices architecture.

JLV VAEC is built using:

- AWS CodeBuild – continuous integration service that builds source code.
- Docker – containerization platform.
- Nginx- Provides proxy capability.
- AWS Elastic Container Service (ECS) – container orchestration service.
- Elastic Container Registry (ECR) – Docker container registry that stores container images.
- AWS S3 – scalable, reliable, and durable object storage.
- AWS Elastic Load Balancing (ELB) – distributes incoming application traffic across multiple targets in one or more availability zone.
- AWS CloudFormation – infrastructure as code.
- AWS Elastic File Storage (EFS) – serverless file system that automatically shrinks and grows with no need for management or provisioning.
- AWS CloudWatch – monitoring and management services that provide data and actionable insights for AWS.
- AWS Relational Database Service (RDS) – web service designed for assisting with the setup, operation and scaling of a relational database for use in the application.
- AWS Systems Manager Parameter Store - provides secure storage for configuration and secrets data.
- AWS Virtual Private Cloud (VPC) - a logically isolated virtual network in AWS that you define and deploy resources in.
- AWS Certificate Manager (ACM) - a service that lets you create, manage, and deploy SSL and TLS certificates.
- AWS Transit Gateway - a network hub used to interconnect VPCs and on-premises networks
- Microsoft SQL server– relational database engine developed by Microsoft.
- Apache Tomcat – Java server
- YAML (Yet Another Markup Language) – human friendly data serialization language for all programming languages.
- Java – object-oriented programming language.

**Figure 2: Sample YAML Template**

```
AWSTemplateFormatVersion: 2010-09-09
Description: Production - ECR Repositories storing JLV docker images

Parameters:
  pEnvName:
    Type: String
    AllowedValues: [ silver, gold, pre-prod, prod ]
    Description: Environment Name - silver, gold, pre-prod, prod

Resources:
  rJLVRepo:
    Type: AWS::ECR::Repository
    Properties:
      ImageScanningConfiguration:
        ScanOnPush: true
      ImageTagMutability: MUTABLE
      RepositoryName: !Sub jlv-web-${pEnvName}
```

Developers create the code which describes each individual service, and the code is saved as a template. These templates are converted into Docker images.

Docker is a technology that provides the tools to build, run, test, and deploy distributed applications that are based on Linux containers. Amazon ECS uses Docker images in task definitions to launch containers as part of tasks in clusters.

**Table 1: Project Naming Convention**

Project	Service	Environment
JLV	jMeadows	Production
JLV	JLV	Production
JLV	VistA Data Service (VDS)	Production
JLV	Report Builder (JLV RB)	Production
JLV	JLV QOS (Quality of Service)	Production
JLV	EHRM	Production

The JLV team has created two clusters in Production – Cluster A and Cluster B. Our goal in the future is to use both clusters for Blue/Green deployments. The designation of which cluster is Blue, or Green will be determined by which is live at the time.

Until the Blue/Green architecture is fully implemented, we will rely on manual deployments. To manually deploy JLV, each service will have to be built in AWS CodeBuild which will push the new image to AWS Elastic Container Registry (ECR). To deploy the new code, the task needs to be manually stopped which will cause the service to recreate a task with the latest container image from ECR.

When an application is developed and deployed to an AWS ECS Cluster, having two separate environments—blue and green—increases availability and reduces risk. The green environment is the production environment that will handle live traffic. The newest application version will be deployed and tested in the blue environment. After sufficient testing, we then “swap” the Application Load Balancer (ALB) targets between the two environments.

### 1.3. Constraints

Not applicable to JLV.

## 2. Roles and Responsibilities

[Table 2](#) and [Table 3](#) list the project and DIBRG roles and responsibilities.

**Table 2: Project Roles**

Name	Title/Group	Company
REDACTED	JLV Program Manager (PgM)	VA
REDACTED	JLV Project Manager (PM)	VA
REDACTED	JLV Functional Analyst	VA
REDACTED	Scrum Master	Liberty ITS
REDACTED	Dev Ops Engineer	Liberty ITS
REDACTED	Java Developer	Liberty ITS
REDACTED	Windows Sys Admin	Liberty ITS
REDACTED	Application Architect (Project Support)	Liberty ITS
REDACTED	Ops Engineer	Liberty ITS
REDACTED	Dev Ops Lead	Liberty ITS
REDACTED	Product Owner (Project Support)	Liberty ITS
REDACTED	Mid Java Developer	Liberty ITS
REDACTED	Developer	Liberty ITS
REDACTED	Java Developer	Liberty ITS
REDACTED	Business Analyst (Project Support)	Liberty ITS
REDACTED	Database Administrator	Liberty ITS
REDACTED	Project Manager	Liberty ITS
REDACTED	Information Assurance	Liberty ITS
REDACTED	Java Developer	Liberty ITS
REDACTED	Tester	Liberty ITS
REDACTED	Configuration Manager (Project Support)	Liberty ITS
REDACTED	Operations Engineer	Liberty ITS

REDACTED	Technical Writer	Liberty ITS
REDACTED	Ops Engineer	Liberty ITS
REDACTED	Tester	Liberty ITS
REDACTED	Operations	Liberty ITS
REDACTED	Sr. Automation Tester/Architect	Liberty ITS
REDACTED	Scheduler (Project Support)	Liberty ITS
REDACTED	JLV/CV Test Lead	Liberty ITS
REDACTED	Project Manager	Liberty ITS
REDACTED	Test Engineer	Liberty ITS
REDACTED	Tester	Liberty ITS
REDACTED	Tester	Liberty ITS
REDACTED	Database Administrator	Liberty ITS
REDACTED	Java Developer	Liberty ITS
REDACTED	Sr. Scrum Master – SAFe (Project Support)	Liberty ITS
REDACTED	Sr. AWS Cloud Architect	Liberty ITS
REDACTED	Contract Program Manager	Liberty ITS
REDACTED	Tester	Liberty ITS
REDACTED	Operations Lead	Liberty ITS
REDACTED	AWS Cloud Architect	Liberty ITS
REDACTED	Sr. Java Developer	Liberty ITS
REDACTED	Technical Writer	Liberty ITS
REDACTED	Sr. Java Developer	Liberty ITS
REDACTED	Information Assurance	Liberty ITS
REDACTED	Tester	Liberty ITS

Please note that references to JLV Support in the table below indicate Liberty Team Operations and Engineers. See [Table 7](#) for additional details regarding the Phase/Role column of [Table 3](#).

**Table 3: Deployment, Installation, Backout, and Rollback Roles and Responsibilities**

Team	Phase/Role	Tasks
Enterprise Project Management Office (EPMO)	Approval for Release to Production	Review the Release Readiness Report (RRR) with JLV PM and Health Product Support (HPS) for approval; review and approve the Service Now (SNOW) board entry.

Team	Phase/Role	Tasks
JLV Support	Deployment Coordination	<ul style="list-style-type: none"> <li>Plan and schedule deployments (including orchestration with vendors)</li> <li>Determine and document the roles and responsibilities of those involved in deployments</li> <li>Test for operational readiness</li> </ul>
JLV Support	Installation	<ul style="list-style-type: none"> <li>Schedule installations</li> <li>Ensure that the Authority to Operate (ATO) and certificate authority security documentation is in place</li> <li>Coordinate training</li> </ul> See <a href="#">Section 4.8.2</a> for the detailed installation process.
JLV Support	Backout	<ul style="list-style-type: none"> <li>Confirm the availability of backout instructions and backout strategy.</li> <li>Identify the criteria that triggers a backout</li> </ul> See <a href="#">Section 5</a> for the detailed backout process.
JLV Support	Rollback	<ul style="list-style-type: none"> <li>Confirm the availability of rollback instructions and rollback strategy.</li> <li>Identify the criteria that triggers a rollback</li> </ul> See <a href="#">Section 6</a> for the detailed rollback process.
JLV Support	Post-Deployment	Provide software and system support

### 3. Deployment

The JLV deployment workflow is as follows.

1. Once EPMO approval is complete, the JLV Support team schedules the deployment.
2. JLV Support completes a SNOW Change Order (CHG).
3. The DevOps team will create a Docker container image with the latest application code and configurations using AWS CodeBuild.
4. The container image is tagged and pushed to AWS Elastic Container Registry (ECR).
5. The AWS Elastic Container Service (ECS) Task Definition is updated with the latest ECR image version.
6. After the ECS Service is updated to deploy the latest Task Definition, the ECS service will create the respective containers using the task definition.
7. The new image will have been tested in the lower environment (Pre-Prod), however, smoke testing is conducted in Production during maintenance hours.
8. Once the deployment is complete, Production testing is verified by the JLV Support team; please see [Access Requirements and Skills Needed for Installation](#) for additional information.
9. If there are any issues, we can revert the change by updating the services with the previous task definition and image located in ECR.

#### 3.1. Timeline

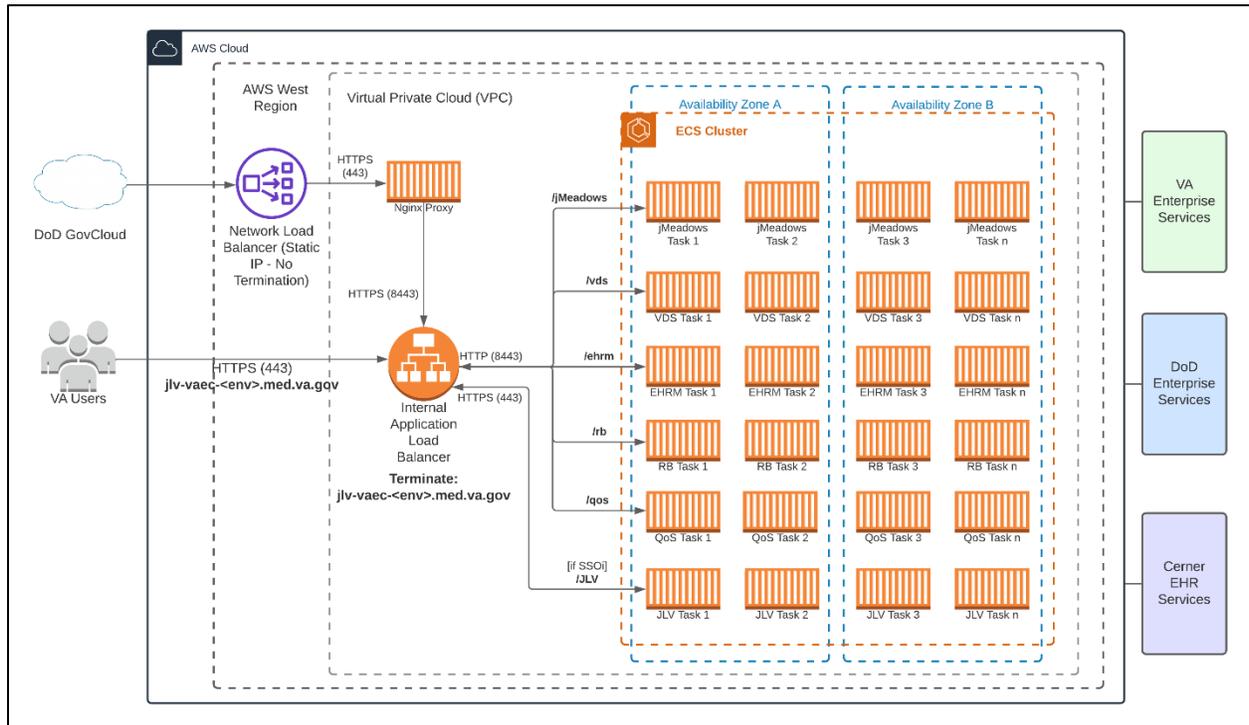
The deployment and installation have a duration of 8 hours.

## 3.2. Site Readiness Assessment

JLV is a Production, enterprise-wide application hosted in VAEC. All site readiness assessments are completed by JLV Operations.

### 3.2.1. Deployment Topology (Targeted Architecture)

Figure 3: JLV Topology<sup>3</sup>



JLV is hosted on AWS with our application containerized using Docker images. The Docker images are built on AWS CodeBuild and pushed to Elastic Container Registry (ECR) image repository. The application is running in AWS Elastic Container Service (ECS) which pulls in new Docker images for each tier from ECR. ECS abstracts the need to maintain virtual servers thus making it a serverless architecture. Each tier of JLV will function as an ECS which will orchestrate task/container placement and direct traffic from the Application Load Balancer (ALB). A Task runs one or more containers and gets its instructions from its Task Definition.

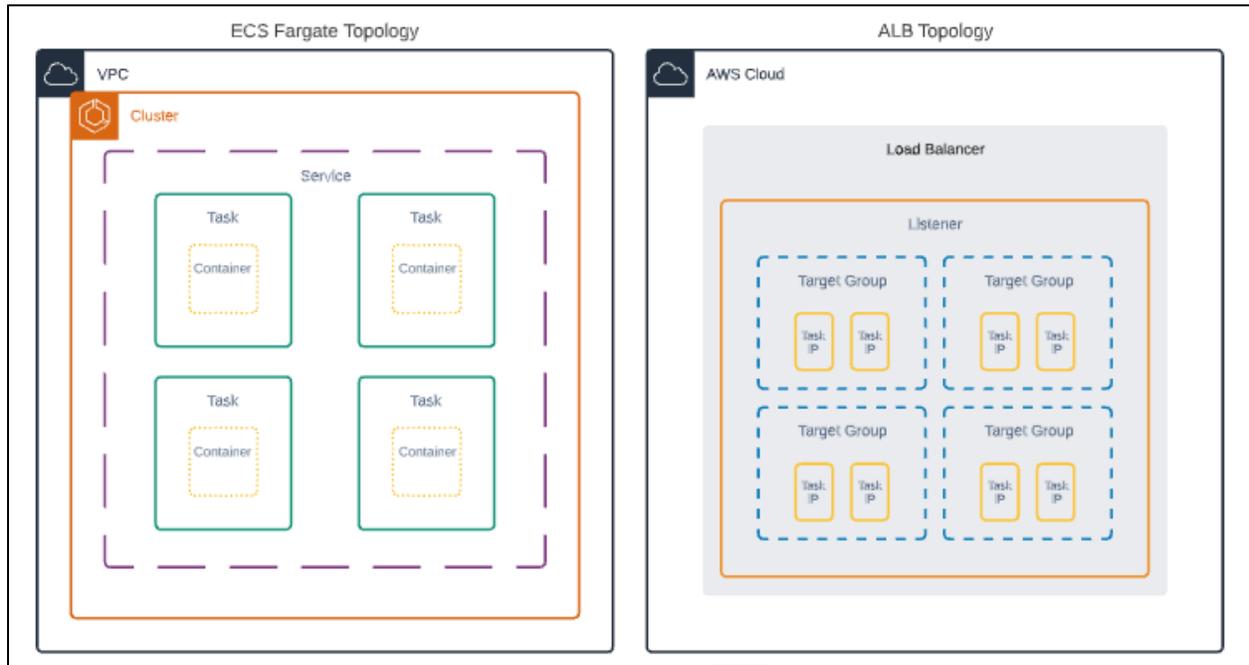
Each application runs on top of Tomcat 8.5 which connects to the SQL database (DB) hosted on Relational Database Server (RDS). The JLV web tier task runs two (2) containers, one for the SiteMinder Identity Access Management connection, and the other for the main application that uses Apache Httpd as a proxy to Tomcat. The Report Builder tier uses Amazon Elastic File Storage (EFS) to store report files. All tiers use Amazon CloudWatch for logging and

<sup>3</sup> Note that all inbound and outbound traffic to the JLV Virtual Private Cloud (VPC) will pass through an AWS Transit Gateway, (which is not shown on the figure).

monitoring. Logs are also shipped to the VAEC’s Central Logging Solution to be viewed in Kibana.

There is a Network Load Balancer (NLB) setup for the DoD JLV connection which accepts traffic and forwards to the ALB.

**Figure 4: JLV ECS and ALB Topology**



### 3.2.2. Site Information (Locations, Deployment Recipients)

The host site for JLV is VAEC located in the AWS west region.

### 3.2.3. Site Preparation

All site preparation is completed by JLV Operations team.

JLV container images have the latest program updates and security patches. These updates are performed every time a new container image is built for a new version of the application.

[Table 4](#) describes the preparation required by the site(s) prior to deployment.

**Table 4: Site Preparation**

Site	Problem/Change Needed	Features to Adapt/Modify to New Product	Actions/Steps	Owner
VAEC	Security Patches/Program Updates	Non-identifiable	Implement/Verify	JLV OPS

### 3.3. Resources

Descriptions of the hardware, software, facilities, and documentation are detailed in the following subsections.

#### 3.3.1. Facility Specifics

VAEC is a cloud-based General Support System (GSS), hosted on AWS GovCloud; FedRAMP package #: REDACTED. As per AWS's FedRAMP authorization, AWS is responsible for all Disaster Recovery Plan (DRP) activities within this environment. AWS's DRP can be found in FedRAMP package #: REDACTED. The AWS is designed utilizing separate data centers (availability zones - AZs), and geographically separated regions. Currently AWS has two regions located in Iowa and Virginia.

The VAEC AWS GovCloud High is a GSS that provides a secure application and hosting environment for VA applications, content, and utilities. These applications and services are used to deliver content to an audience made up of employees, veterans, contractors, partners across all VA medical centers and component facilities, Federal government, and the general public. Content and applications are provided by Veterans Benefits Administration (VBA), Veterans Health Administration (VHA), National Cemetery Administration (NCA), and VA-level support offices. VAEC provides the following services: Content delivery, Application Hosting and Management Services.

#### 3.3.2. Hardware

The VAEC infrastructure is hosted by AWS GovCloud, a cloud service provider. The AWS GovCloud platform is used to provide a variety of hosting environments to suit a variety of needs. AWS GovCloud can support applications categorized up to "High" as rated in accordance with Federal Information Processing Standard (FIPS) 199. VA applications available to the public are hosted in AWS GovCloud.

A dedicated private data link (AWS Direct Connect) provides all connectivity for VA resources communicating to the environment. Virtual Private Clouds (VPCs) wrap the applications within AWS GovCloud to encapsulate network access. Access from the applications to VA internal resources such as Identity, Credential, and Access Management (ICAM) and Active Directory (AD) Services are conducted over the encrypted private data link to the VA Network.

VAEC is in two (2) regions with three (3) Availability Zones in each region designed to allow United States (U.S.) government agencies, contractors, and customers to move sensitive workloads into the cloud for addressing specific regulatory and compliance requirements. AWS GovCloud does not manage logical access controls within the VAEC system boundary. VAEC offers the same level of security as other VA physical technology centers and supports existing VA security controls and certification requirements such as FISMA, Health Insurance Portability and Accountability Act of 1996 (HIPAA), HITECH, SAS-70, ISO 27001, FIPS 140-2 compliant end points, and PCI DS.

[Table 5](#) describes the hardware specifications required at each site prior to deployment. Please see [Table 3](#) for details about the party or parties responsible for preparing the site to meet the hardware specifications.

**Table 5: Virtual Machine (VM) Production Hardware Specifications (AWS Managed)**

Required Hardware	Model	Configuration	Manufacturer	Number of Containers
<b>ECS Task</b>	Amazon Linux 2	vCPU 2 RAM 16 GB Storage 20 GB	Virtual	Automatically Scaled
<b>JLV Web Container (main)</b>	Amazon Linux 2	vCPU 1 RAM 8 GB Storage 20 GB	Virtual	Manually Scaled
<b>Single Sign on Internal (SSOi) Container (sidecar)</b>	Amazon Linux 2	vCPU 1 RAM 8 GB Storage 20 GB	Virtual	Manually Scaled
<b>RDS Instance</b>	SQL Server Enterprise Edition 14.00.3049.1.v1	vCPU 16 RAM 64 GB Storage 500 GB	Virtual	Automatically Scaled

### 3.3.3. Software

[Table 6](#) describes the software specifications required at each site prior to deployment. Please see [Table 3](#) for details about the party or parties responsible for preparing the site to meet the software specifications.

**Table 6: Software Specifications**

Required Software	Make	Version	Manufacturer	Other
SQL Server Enterprise Edition	N/A	14.00.3049.1.v1	Microsoft	N/A
Amazon Linux	N/A	2	Amazon	N/A
Apache	N/A	2.4	Apache	N/A
SiteMinder	N/A	12.51	CA Technologies	N/A
Tomcat	N/A	8.5	Apache	N/A

More information about SSOi server installation can be found in the *CA SiteMinder Apache Web Agent Install & Configuration Guide*, maintained by Identity and Access Management (IAM).

### 3.3.4. Communications

JLV Operations team performs JLV installation and deployment activities in the virtualized environments at VAEC utilizing the release-ready package. When possible, the installation is performed during off-hours to minimize the impact on users. We will use a 60-minute window for downtime to manually deploy and test.

An overview of typical steps and/or communication during the implementation process is as follows:

1. The Configuration Manager submits a JLV release (RLSE) notification via SNOW/CHG Order
2. Plan the system upgrade and change notifications:
  - a. Notify the JLV PgM and PM and the OIT PM/COR
3. Perform the installation/deployment:
4. The Scrum Master notifies the stakeholders and Product team that systems are updated.

### 3.3.4.1. Deployment/Installation/Backout Checklist

[Table 7](#) captures the coordination effort and documents the day/time/individual when each activity (deploy, install, back-out) is completed for a project.

**Table 7: Deployment Installation and Backout Checklist**

Activity	Day	Time	Completed By
Deployment	Decision by VA OIT	Deployment dependent on a planned maintenance ticket	JLV Operations
Installation	Deployments staged	Coordinated with JLV OPS and JLV DevOps	JLV Operations
Backout	As needed	As needed, with a time estimate to be communicated to stakeholders when determined	JLV Operations

## 4. Installation

### 4.1. Preinstallation and System Requirements

Please see the [Hardware](#) and [Software](#) sections for information regarding preinstallation system requirements.

### 4.2. Platform Installation and Preparation

JLV is being installed within the JLV VAEC Virtual Private Clouds (VPC) using the ECS managed service. The JLV services are stored as container images in ECR.

Docker technology is used to create file images. Docker is a set of “platform as a service” (PAAS) products that use Operating System (OS)-level virtualization to deliver software in packages called containers

When a Docker file is built, the configuration instructions are executed, and the artifacts are installed into the image. This activity creates the container image.

Docker images are packaged up and sent to AWS ECR. When changes are made to individual services, a new Docker image is created, and the new image is sent to ECR, where a new container is created to replace the outdated container.

**Table 8: Implementation Plan Summary**

Considerations	Associated Details	
What systems are affected?	<b>Component:</b>	<b>Deployed to:</b>
	JLV (Web/SSOi)	VAEC Environment
	JLV Report Builder	VAEC Environment
	jMeadows Data Service	VAEC Environment
	EHRM Service	VAEC Environment
	VDS	VAEC Environment
	JLV QoS	VAEC Environment
Who is impacted by the change?	JLV users	
What is the estimated timeframe for restoring service?	Estimated down time is 60 minutes for deployment and testing.	
What pre-implementation work is required?	Build Docker images using AWS CodeBuild.	

**Figure 5: Screenshot of JLV Cluster**

The screenshot displays the AWS ECS console for the JLV Cluster. At the top, it shows task counts: Pending (0 Fargate, 0 EC2, 0 External), Running (6 Fargate, 0 EC2, 0 External), Active service (7 Fargate, 0 EC2, 0 External), and Draining (0 Fargate, 0 EC2, 0 External). Below this are navigation tabs for Services, Tasks, ECS Instances, Metrics, Scheduled Tasks, Tags, and Capacity Providers. A toolbar includes buttons for Create, Update, Delete, and an Actions dropdown. A filter section shows 'Filter in this page', 'Launch type' set to ALL, and 'Service type' set to ALL. The main table lists the following services:

Service Name	Status	Service type	Task Definition	Desired tasks	Running tasks	Launch type
JLV	ACTIVE	REPLICA	JLV-Prod-A:19	1	1	FARGATE
jlvrb	ACTIVE	REPLICA	jlvrb-Prod-A:7	1	1	FARGATE
JLV-SSOI-OFF	ACTIVE	REPLICA	JLV-SSOI-OFF-Prod:3	0	0	FARGATE
jmeadows	ACTIVE	REPLICA	jmeadows-Prod-A:13	1	1	FARGATE
vistadataservice	ACTIVE	REPLICA	vistadataservice-Prod-...	1	1	FARGATE
ehrm	ACTIVE	REPLICA	ehrm-Prod-A:12	1	1	FARGATE
jlvqos	ACTIVE	REPLICA	jlvqos-Prod-A:13	1	1	FARGATE

JLV ECS Cluster is a grouping of containers which together form the JLV application.

- There is a setting in the cluster which describes the number of containers that are needed at any one time.
- Any time one of the containers crashes, the ECS service will automatically create a new container to ensure the desired number of containers is maintained.
- Each container is described by the task definition associated with each specific container.
- Task Definitions are stored in ECS.
- ECR stores and manages container images.

### 4.3. Download and Extract Files

The application code is pulled into the Docker file from GitHub and built during the container build process. Configuration files and certificates are pulled into the Docker file from a Nexus artifact repository located on a server in the AWS JLV domain.

### 4.4. Database (DB) Creation

The JLV DB was migrated to AWS Relational Database Service (RDS). It uses an SQL Server Enterprise Edition DB, to store user profile information, audit records, and medical standard translation and mapping reference tables.

System design specifications and diagrams can be found in the VA JLV Product Repository on GitHub. See [Purpose](#) for the link to the repository.

### 4.5. Installation Scripts

This does not apply to JLV. There are only Docker files which are deployment templates for creating images. Docker will install any software, configurations, and artifacts needed.

### 4.6. Cron Scripts

Cron scripts are Linux-based events. There are currently no cron scripts run for JLV.

The singular, regularly scheduled event is the hourly server health check, a Windows-based event.

### 4.7. Access Requirements and Skills Needed for Installation

AWS Console or Command Line Interface (CLI) access is required for installation activities. JLV System Engineers have been granted access, and they are designated to access the jump servers for deployment, maintenance, and backout activities. (A jump server, jump host or jump box is a system on a network used to access and manage devices in a separate security zone.) This document assumes the installer has knowledge and experience with the AWS cloud platform, Docker containers, MS SQL Server, Linux, Apache, and Tomcat, in addition to a general understanding of the web-based applications and familiarity with networking and basic troubleshooting, such as Telnet and ping.

### 4.8. Installation Procedures

The subsections below detail pre-installation, and installation procedures. See [Purpose](#) for the link to the repository.

**Note:** Estimated down time is 60 minutes for deployment and testing.

#### 4.8.1. Preinstallation Procedures

Record the JLV software version number to be installed (for reference), as well as the software version number of the previous installation

If the database changes are needed, follow the steps below in [section 4.8.2.7](#).

Once the preinstallation activities are complete, the installation of JLV system components begins in the primary environment.

## **4.8.2. Installation in ECS Cluster Environments**

Complete these installation steps and validate the installation according to the steps in [Installation Verification Procedures](#). See the [Deployment](#) workflow for the detailed process.

### **4.8.2.1. Update JLVQoS Package.**

1. Login to AWS CodeBuild in the Console.
2. Navigate to Build projects and select “jlvqos-prod”
3. Select “Start build with overrides”
4. Go to the Environment variables override section and expand the details.
5. Update the "IMAGE\_TAG" variable with the proper tag and verify other environment variables.
6. Select "Start build".
7. Go to AWS ECS in the Console and select “Clusters”.
8. Select the JLV-Prod-A cluster
9. Select the JLV-QoS task
10. Stop the JLV-QoS task – AWS will automatically start a new task with the latest version

### **4.8.2.2. Update JLVRB Package**

1. Login to AWS CodeBuild in the Console.
2. Navigate to Build projects and select “reportbuilder-prod”
3. Select “Start build with overrides”
4. Go to the Environment variables override section and expand the details.
5. Update the "IMAGE\_TAG" variable with the proper tag and verify other environment variables.
6. Select "Start build".
7. Go to CloudFormation in the Console and select “project-ecs-jlv-rb-prod”.
8. Select “Update” then “Use current template”.
9. Change pBuildTag to the IMAGE\_TAG variable that was created in step 5.
10. Select “Update Stack”
11. Wait for the old task definition to drain or stop the process.

### **4.8.2.3. Update JLV Package**

1. Login to AWS CodeBuild in the Console.
2. Navigate to Build projects and select “jlv-web-prod”
3. Select “Start build with overrides”
4. Go to the Environment variables override section and expand the details.
5. Update the "IMAGE\_TAG" variable with the proper tag and verify other environment variables.
6. Select "Start build".
7. Go to CloudFormation in the Console and select “project-ecs-web-prod”.
8. Select “Update” then “Use current template”.
9. Change pBuildTag to the IMAGE\_TAG variable that was created in step 5.
10. Select “Update Stack”

11. Wait for the old task definition to drain or stop the process.

#### **4.8.2.4. Update VistADataService (VDS) Package**

1. Login to AWS CodeBuild in the Console.
2. Navigate to Build projects and select “vds-prod”
3. Select “Start build with overrides”
4. Go to the Environment variables override section and expand the details.
5. Update the "IMAGE\_TAG" variable with the proper tag and verify other environment variables.
6. Select "Start build".
7. Go to CloudFormation in the Console and select “project-ecs-vistadataservice-prod”.
8. Select “Update” then “Use current template”.
9. Change pBuildTag to the IMAGE\_TAG variable that was created in step 5.
10. Select “Update Stack”
11. Wait for the old task definition to drain or stop the process.

#### **4.8.2.5. Update jMeadows Package**

1. Login to AWS CodeBuild in the Console.
2. Navigate to Build projects and select “jmeadows-prod”
3. Select “Start build with overrides”
4. Go to the Environment variables override section and expand the details.
5. Update the "IMAGE\_TAG" variable with the proper tag and verify other environment variables.
6. Select "Start build".
7. Go to CloudFormation in the Console and select “project-ecs-jmeadows-prod”.
8. Select “Update” then “Use current template”.
9. Change pBuildTag to the IMAGE\_TAG variable that was created in step 5.
10. Select “Update Stack”
11. Wait for the old task definition to drain or stop the process.

#### **4.8.2.6. Install Electronic Health Record Modernization (EHRM) Service**

1. Upload EHRM artifact to Nexus repository
2. Update EHRM Dockerfile to point to new artifact
3. Login to AWS CodeBuild in the Console.
4. Navigate to Build projects and select “ehrm-prod”
5. Select “Start build with overrides”
6. Go to the Environment variables override section and expand the details.
7. Update the "IMAGE\_TAG" variable with the proper tag and verify other environment variables.
8. Select "Start build".
9. Go to CloudFormation in the Console and select “project-ecs-ehrm-prod”.
10. Select “Update” then “Use current template”.
11. Change pBuildTag to the IMAGE\_TAG variable that was created in step 5.
12. Select “Update Stack”
13. Wait for the old task definition to drain or stop the process.

#### 4.8.2.7. Steps for Database Updates

1. Remote desktop into the Windows jumpbox
2. Open Microsoft SQL Server Management Studio (SSMS)
3. Connect to *RDS instance*
4. Open the SQL script <filename>.sql, provided with the JLV source code package submission
5. Execute the SQL script <filename>.sql

### 4.9. Installation Verification Procedures

After completing the installation processes detailed in [Installation Procedures](#) the Operations Team performs a manual smoke test. Use the steps below to test each module as an end user to validate the installation, deployment, and functionality of all JLV applications and services.

1. Validate that JLV is running
  - a. Access the JLV application web page using the following URL: REDACTED
2. Validate that VA Personal Identification Verification (PIV) and Personal Identification Number (PIN) are accepted by SSOi
3. Validate that the system status appears on the JLV **Login** page
  - a. **Expected Result:** The system status should show a circular, green icon with a white checkmark
4. Validate the ability to log in with VA credentials
5. Validate that VA data displays within the JLV widgets, using test patients REDACTED and REDACTED
6. Validate that FEHR data displays within the JLV widgets
7. Validate that community partner data displays within the JLV widgets
8. Validate that VA terminology mapping occurs
  - a. **Expected Result:** VA terminology is properly mapped in the JLV widgets
9. Validate that DOD terminology mapping occurs
  - a. **Expected Result:** DOD terminology is properly mapped in the JLV widgets
10. Validate that QoS is running by verifying that QoS is writing updates to the DB in the QoS\_LOGS table
  - a. Run the following command in SSMS on the active MSSQL server: select top 100 \* from jlv.dbo.QOS\_LOGS and order by date desc
    - i. **Expected Result:** The select top 100\* results will be displayed and indicate a time stamp of within 5 minutes of the time the query was run
    - ii. If the top rows do not show, double check the installation steps
11. Validate that Report Builder is running
  - a. **Expected Result:** The user can add items to the Report Builder and generate a printable Portable Document Format (PDF) file
12. Once all verification steps are complete, JLV users are rerouted back to the primary Production operating environment

## 4.10. System Configuration

[Table 5](#) describes the server configurations for JLV Enterprise Production infrastructure hosted at the VAEC

## 4.11. DB Tuning

JLV Engineering/Development ensure DB indexing for each release. The DB schema and the performance-based jobs are validated by JLV Database Administrators (DBAs) for the deployment of each release.

# 5. Backout Procedures

Both backout and rollback procedures are performed consistently for each JLV service to return to the last known good operational state of the software and platform settings.

## 5.1. Backout Strategy

If a backout/rollback is required for one of the JLV services deployed to Prod ECS cluster, the JLV team will run a CloudFormation template that will replace the running service/container with an older functional container that is stored in ECR.

## 5.2. Backout Considerations

The following subsections detail the considerations for backing out of the current installation of JLV.

### 5.2.1. Load Testing

Load testing is currently being coordinated with the VA Enterprise Testing Service (ETS) team.

### 5.2.2. User Acceptance Testing (UAT)

UAT results were not available at the time of this writing. When all testing cycles (including UAT) are complete, the data is made available in the VA JLV Product Repository in GitHub. See [Purpose](#) for the link to the repository.

## 5.3. Backout Criterion

The criterion for backing out of the current installation is that JLV does not operate as intended when tested by VA and partner testers and the JLV Support team.

## 5.4. Backout Risks

The risks for executing the backout are minimal because a backout is performed during planned downtime when users are not accessing the system. Once the restored system is online and validated, user access continues.

If a backout is initiated later in the deployment window, restoration time may exceed the downtime planned for deployment. This risk is mitigated by scheduling deployments for weekends and other times when expected usage levels are low.

## 5.5. Authority for Backout

If a backout is necessary, approval for the backout comes from the VA PgM (REDACTED) or VA PM (REDACTED).

## 5.6. Backout Procedures

Because backout and rollback are performed consecutively, the backout and rollback procedures are combined in [Rollback Procedures](#).

## 5.7. Backout Verification Procedures

See [Installation Verification Procedures](#).

# 6. Rollback Procedures

If a rollback is required for one of the JLV services deployed to Prod ECS cluster, the JLV team will run a CloudFormation template that will replace the running service/container with an older functional container that is stored in ECR. Rollback Considerations

The consideration for performing a rollback is that the JLV application does not operate as intended when tested by the JLV Support team.

## 6.1. Rollback Criterion

The criterion for performing a rollback is that the JLV application does not operate as intended when tested by the JLV Support team.

## 6.2. Rollback Risks

The risks for executing a rollback are minimal because the system will revert to the last working image/configuration.

## 6.3. Authority for Rollback

If a rollback is necessary, approval for the rollback comes from the VA PgM (REDACTED) or VA PM (REDACTED).

## 6.4. Rollback Procedures

AWS ECR will maintain versions of previous releases. After the initial rollout of the JLV Cloud instance, a rollback would involve restarting a previous version of the JLV application.

If it is determined that a rollback is necessary, task definitions with the previous image version will be deployed to ECS.

## 6.5. Rollback Verification Procedures

After completing the rollback procedures, perform the validation steps in [Installation Verification Procedures](#).

## A. Acronyms and Abbreviations

[Table 9](#) lists the acronyms and abbreviations are used throughout this document.

**Table 9: Acronyms and Abbreviations**

<b>Acronym</b>	<b>Definition</b>
<b>AD</b>	Active Directory
<b>ALB</b>	Application Load Balancer
<b>API</b>	Application Programming Interface
<b>ATO</b>	Authority to Operate
<b>AWS</b>	Amazon Web Services
<b>BHIE</b>	Bidirectional Health Information Exchange
<b>CA</b>	Computer Associates
<b>CD2</b>	Critical Decision Point 2
<b>CDR</b>	Clinical Data Repository
<b>CM</b>	Change Management
<b>CHDR</b>	Clinical/Health Data Repository
<b>CHG</b>	Change Order
<b>COR</b>	Contracting Officer's Representative
<b>CVIX</b>	Central VistA Imaging Exchange
<b>DAS</b>	Data Access Service
<b>DB</b>	Database
<b>DBA</b>	Database Administrator
<b>DES</b>	Data Exchange Service
<b>DIBRG</b>	Deployment, Installation, Backout, and Rollback Guide
<b>DRP</b>	Disaster Recovery Plan
<b>DoD</b>	Department of Defense
<b>ECR</b>	Elastic Container Registry
<b>ECS</b>	Elastic Container Service
<b>EHR</b>	Electronic Health Record
<b>EHRM</b>	Electronic Health Record Modernization
<b>EP</b>	Elevated Privilege
<b>EPMO</b>	Enterprise Program Management Office
<b>FEHR</b>	Federal Electronic Health Record
<b>FHIR</b>	Fast Healthcare Interoperability Resources
<b>GB</b>	Gigabyte
<b>GUI</b>	Graphical User Interface
<b>HAIMS</b>	Healthcare Artifact and Image Management Solution
<b>HIE</b>	Health Information Exchange
<b>HTTPS</b>	Hypertext Transfer Protocol Secure
<b>IAM</b>	Identity and Access Management
<b>IP</b>	Internet Protocol
<b>IT</b>	Information Technology
<b>JDBC</b>	Java Database Connectivity

<b>Acronym</b>	<b>Definition</b>
<b>JLV</b>	Joint Longitudinal Viewer
<b>LDAP</b>	Lightweight Directory Access Protocol
<b>MHS</b>	Military Health System
<b>MS</b>	Microsoft
<b>MPI</b>	Master Person Index
<b>NCA</b>	National Cemetery Administration
<b>OIT</b>	Office of Information and Technology
<b>OS</b>	Operating System
<b>PAAS</b>	Platform As A Service
<b>PDWS</b>	Patient Discovery Web Service
<b>PDF</b>	Portable Document Format
<b>PgM</b>	Program Manager
<b>PIN</b>	Personal Identification Number
<b>PIV</b>	Personal Identification Verification
<b>PM</b>	Project Manager
<b>POC</b>	Point of Contact
<b>POM</b>	Production Operations Manual
<b>QoS</b>	Quality of Service
<b>RAM</b>	Random Access Memory
<b>REST</b>	Representational State Transfer
<b>RPC</b>	Remote Procedure Calls
<b>RRR</b>	Release Readiness Report
<b>SOAP</b>	Simple Object Access Protocol
<b>SNOW</b>	Service Now
<b>SSMS</b>	SQL Server Management Studio
<b>SSOi</b>	Single Sign on Internal
<b>SQL</b>	Structured Query Language
<b>TCP</b>	Transmission Control Protocol
<b>TMDS</b>	Theater Medical Data Store
<b>UAT</b>	User Acceptance Testing
<b>URL</b>	Universal Resource Locator
<b>U.S.</b>	United States
<b>VA</b>	Department of Veterans Affairs
<b>VAEC</b>	VA Enterprise Cloud
<b>VBA</b>	Veterans Benefits Administration
<b>VDS</b>	VistA Data Service
<b>VHA</b>	Veterans Health Administration
<b>VIP</b>	Veteran-Focused Integration Process
<b>VistA</b>	Veterans Information Systems and Technology Architecture
<b>VM</b>	Virtual Machine
<b>YAML</b>	Yet Another Markup Language